"Mobiles for museum visit should be abolished" : a comparison of smart replicas, smart cards, and phones

PETRELLI, Daniela <http://orcid.org/0000-0003-4103-3565> and O'BRIEN, Sinead

Published version

PETRELLI, Daniela and O'BRIEN, Sinead (2016). "Mobiles for museum visit should be abolished" : a comparison of smart replicas, smart cards, and phones. In: LUKOWICZ, Paul and KRUGER, Antonio, (eds.) UbiComp '16 : Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing Adjunct - UbiComp '16. ACM, 1513-1519.

"*Mobiles for museum visit should be abolished*": A comparison of smart replicas, smart cards, and phones

Daniela Petrelli
Art & Design Research Centre
Sheffield Hallam University
153 Arundel St
Sheffield S1 2NU, UK
d.petrelli@shu.ac.uk

Sinead O'Brien
Art & Design Research Centre
Sheffield Hallam University
153 Arundel St
Sheffield S1 2NU, UK
contact@sineadobrien.net

Ubicomp/ISWC'16 Adjunct , September 12-16, 2016, Heidelberg, Germany
ACM 978-1-4503-4462-3/16/09.
http://dx.doi.org/10.1145/2968219.2974049

Abstract
A comparative evaluation of smart replicas, phone app and smart cards looked at the personal preferences of visitors and the appeal of mobiles in museum exhibitions. As part of an exhibition evaluation, 76 participants used all three interactions modes and gave their opinions in a questionnaire. The result shows that Phone and Replica are equally liked but the Phone is the most disliked interaction mode. Preference for the phone is due to its mobility as opposed to a listen in place interaction; but the phone takes the attention away from the exhibition and isolates from the group. Visitors expect museums to provide the phones as opposed to apps for "bring your own".

Author Keywords
Smart objects; smartphones; smartcards.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
This case study is part of a larger research project: meSch [4] which aims to bridge the gap between the physical and the digital by means of technology used to

Figure 1. The smart replicas on the case with the originals at the entrance next to the replicas pickup point (bottom left).

design tangible interactions expected to engage visitors at a deeper level. Visitors are offered multiple options to choose from; they interact with smart objects [2] and spaces [3] to trigger the delivery of content; the system tracks the visit and uses this information to generate personalized souvenirs that can be used online to extend the relation museum-visitor beyond the building and the physical visit.

In our design we intentionally avoid screens and obviously-digitally devices in favour of crafted bespoke solutions that fit the individual museum. The question now is: "how this compares with an app?" This paper addresses this questions and summarises an experiment run as part of the Atlantikwall exhibition where a set of NFC-augmented smart replicas were compared to smart cards and a mobile guide.

The Atlantikwall temporary exhibition

Through a process of co-design and co-creation, the meSch partners designed the technological components of a temporary exhibition open to the public from April to November 2015 at MUSEON in The Hague, The Netherlands. While designers and scientists focussed on the interaction, the museum searched their archives for relevant content to be framed as personal stories retold in the first person. The exhibition focussed on the demolition of a third of the city carried out by the Nazi in WWII as part of the construction of a defensive system against the Allies along the north coast of continental Europe. A traditional exhibition of objects and information panels was enriched by interactivity: smart replicas embedded NFC tags. Each object represented one of the characters involved in the historical facts: the German soldier, the Dutch civilian and the civil servant. The 6 smart replicas (Fig.1), 3 for the Dutch language and 3 for the English language, were used to trigger content. At the entrance, visitors selected their preferred language and character by collecting a replica to be used during the visit. 11 NFC readers were positioned next to the glass cases. When a smart replica was placed on the NFC reader, a personal story of the character represented by the object and relevant for the exhibit in the case played in the earpiece and a carousel of historical photos and videos was projected on the glass (Fig.2).

Figure 2. One of the cases at the Atlantikwall exhibition.

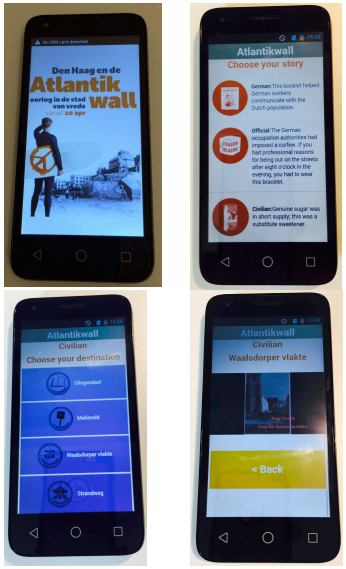

Figure 3. The app screens: start; perspectives; list of places; play.

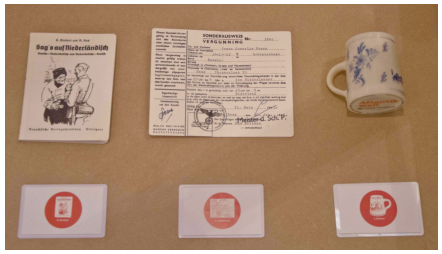

Figure 4. The smart replicas (top) and the corresponding smart cards (bottom).

Comparative Study

The comparative evaluation was designed to determine if there was a difference between the use of a mobile phone and the replicas as a means to activate digital media content within an exhibition. In particular we were interested in the preferences of visitors', although other aspects were looked at.

The smart replicas were the way visitors interacted with the exhibition. For the purpose of the comparative study, a mobile app was developed (Fig. 3). Museum apps were looked at in order to design an interaction in line with current standards. The app was designed to be as much as possible similar to the physical experience, i.e. using the same graphics as the exhibition, following the same selection steps as one would do with the replicas. The visitor first selected the language and the character, then they selected a place from the list of 11 names that mapped the showcases in the exhibition; the audio video content then played automatically.

The replicas and the app capture two very different interaction modes: the first a tangible and embodied interaction, the second a more traditional content delivery. A third mode was introduced to distinguish a further factor within the tangible interaction, specifically to find out if there was an effect due to the aesthetic of the replicas or if instead the practical and embodied aspect (to have an object in one's hand that starts the audio-visual material) was the reason for the preference. In other words we use a set of smart cards to distinguish function and aesthetics (Fig. 4). We expected the materiality of the replicas to generate a higher interest, pleasure, etc. [5] with respect to the card. This part of the study is not included in here.

Experimental setup and procedure

The comparative evaluation was set up as a within subjects controlled experiment with 3 conditions: the use of the phone, the replicas, or the card. It was a "within subjects" setting meaning each participant experienced all three interaction modes. Each mode was used at 3 places in the exhibition. A Latin-Square was used to counterbalance all possible factors: the interactions mode, the character and the case.

Figure 5. Observation: the phone grabs attention and the visitor ignores the objects in the case at his right.

Participants were recruited by the museum via their mailing lists and were given a €20 museum shop voucher as a thank you for taking part. At arrival participants were welcomed by a researcher who explained the experiment and showed a short video of the use of all the three interaction modes. They were then asked to sign the consent form. The evaluation was individual. The researcher assigned one of the three modes (phone, replica or card) while the participant decided the character. The researcher then showed the participant to the first of the three stations for the given mode and retreated to observe (Fig.5). When the sequence of three stations was done, the

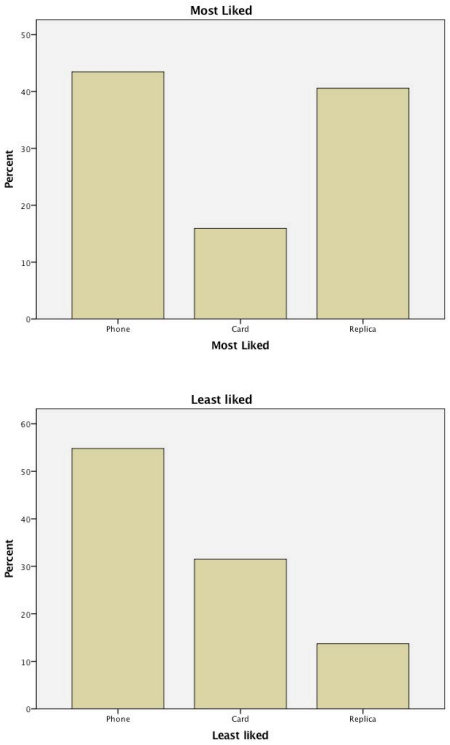

Figure 6. Most (top) and Least (bottom) liked interaction modes.

researchers collected the phone / card / replica and asked the visitor to fill 7 likert-scale questions on their experience (from a previous study [5]) before moving onto the next interaction mode and the next three cases. When all the three modes had been used; participants filled the comparative session of the questionnaire aiming at ascertaining which was the most and least preferred interaction mode and why. The final 5 questions focussed on the use of phones as content delivery in museums.

Visitors were instructed to use the interactive mode as part of a normal visit. Most participants went through the experiment with no pause completing the tasks in about 30-40 minutes, a few spent time reading the panels and looking at the exhibits in a longer visit.

Results

The data collected was a combination of quantitative data (likert-scales), qualitative data (open questions on like-dislike), and researchers' notes. Statistics were applied to the questionnaires, a thematic analysis was used to classify the motivations of like / dislike, and observations were used to compare, contrast or confirm other findings. For reasons of space we limit our discussion to the like / dislike and the questions related to the use of mobile phones in museums.

Overall 76 participants took part in the experiment; 62% female and 38% male. The age range was very wide, spanning from teenagers (2 participants) to octogenarians (3 participants).

The most and least preferred interaction modes were looked at first. While Phone and Replica are equally liked (the difference is not statistically significant), the Phone is strongly disliked even vs. the Card (Fig.6). Given the large age difference across the sample, preferences were tested against the participant's age so as to ascertain if any age group had a dominant preference, e.g. younger generation preferring the phone vs. elderly preferring the replicas. The result does not show any change with regard to age (Fig.7).

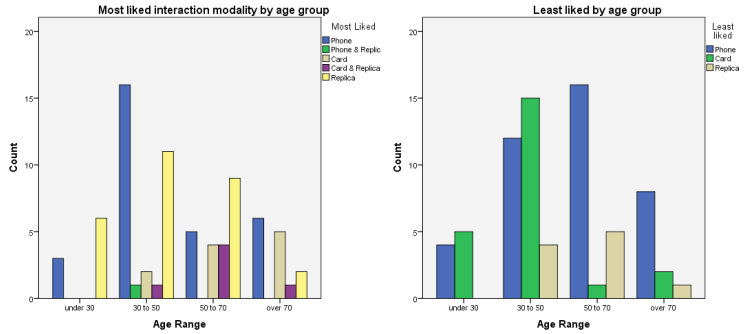

Figure 7. Most and Least liked interaction modes by age groups.

Indeed the age group 30-50 has Phone as most liked, but equally a high dislike for it. Therefore we can conclude that the opinion is shared across the different age groups.

The most frequent motivations given for preferring the Phone were: (i) it allows free movement while listening, (ii) the headphone cancel the background noise[1], and (iii) there was no need to negotiate / queue for an interactive station. The motivations for preferring the Replica were: (i) simple, easy to use and playful, and (ii) physically engaging.

[1] During the experiment there were a number of school visits that created noise and queues to the cases. In addition the exhibition next to the Atlantikwall played sound continuously.

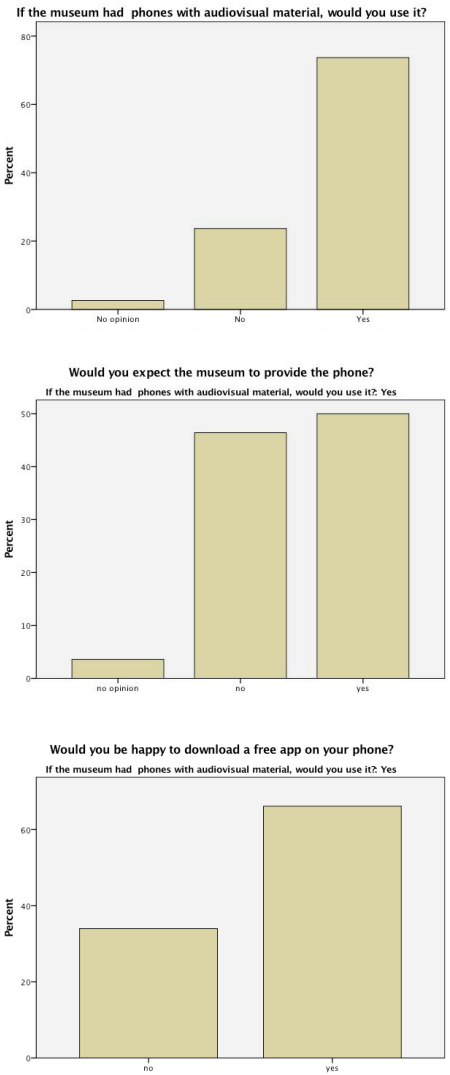

Figure 8. Questions about the use of mobile phones in museums.

Surprisingly 11 participants liked the Card best of all. Motivations were: (i) practical (it fits in the pocket) and (ii) the fact that it had the character written on as opposed to the replica that had no indication of which character it stayed for (Fig. 4) neither was this information displayed on the mobile phone.

As shown in Fig. 6, the least liked mode was the Phone across all ages. It captures the dislike of those who favoured the Replica and the Card. Motivations were: (i) it isolates the visitor and (ii) distracts from the exhibition, this last a known phenomena of mobile devices in museums [1],[6] and observed in our study too (Fig. 5). The motivation given for disliking the Replica was mainly that it bounded the visitor to the earpiece while the Card was judged "boring".

A set of five final questions was aimed at unpacking the use of mobile phones in the museum. The first question asked "If the museum had phones with audio-visual material, would you use it?". A very high majority would indeed use a mobile phone (Fig. 8). The following questions were relevant for those visitors happy to use a phone. We asked: "Would you expect the museum to provide the phone?" and "Would you be happy to download a free app on your phone?" Interestingly about half the respondents would expect the museum to provide the phone and over 30% would not like to download an app on their mobile. This is a clear indication that just providing an app does not guarantee an optimal solution with clear implications for museums in terms of managing the handing / collecting of the phones, their recharging and sterilization. Therefore museums may want to carefully consider all the implications and hidden costs in mobile-based content delivery.

To probe the potential of the "bring your own device" approach we asked: "Have you downloaded museums app before?". Only a small percentage of our participants had actually already gone through the process of downloading and using museum apps on their mobile (Fig. 9).

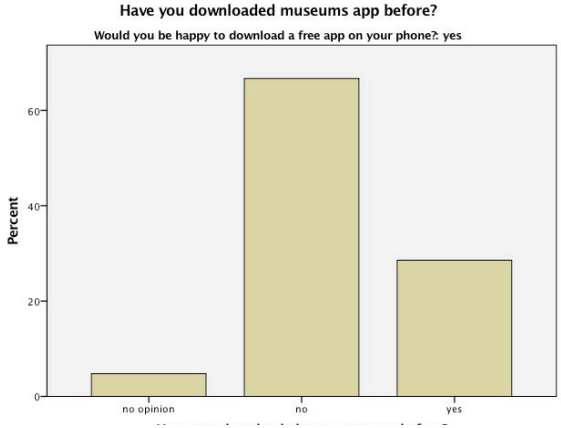

Figure 9. Questions about previous use of museum apps.

A further question asked participants who did not want to download the app why that was the case. Several options were given, as shown in the graphs below (Fig. 10). The major reason for not being willing to download apps seems to revolve around the self management of the phone more than other more factual constraints such as limited bandwidth or lack of knowledge.

What is instead quite remarkable is the high percentage of participants that prefer not to use mobile apps because they get in the way of the enjoyment of being in the exhibition or the visiting with others: "*With the headphones I feel closed off from the outside*", "*It distracts me from the exhibition*", "*with the phone I*

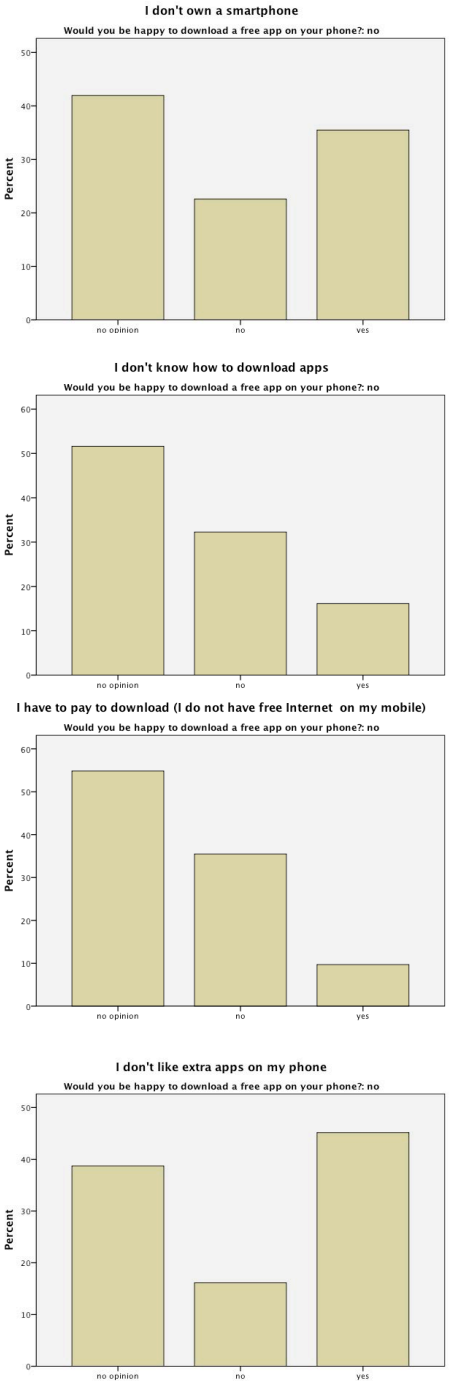

Figure 10. Questions about when they would not use an app.

cannot see anything of the exhibition", "*It makes you look at the phone and you will miss the objects*", "*the phone cuts you off from your environment*".

Conclusions

The comparative experiment enabled us to see the effect of tangible interaction against the use of mobile apps. While there is undoubtedly an advantage in being able to walk about while listening to the content delivered through a mobile phone, or not to wait for a busy interactive case, the use of the phone disrupts the sense of immersion in the exhibition and partially diminishes the engagement with the objects on display. Indeed we observed very many visitors looking at the screen instead of the objects thus missing out on engaging with original objects (Fig. 5). The experiment was run as an individual exercise, however naturalistic observations during opening times made us aware of the social behaviour of visitors using the replicas [2]: sometimes they shared a earpiece among two, others called their partner to listen to something specific they found particularly exciting.

The questionnaire was useful to reflect on the implications of offering a mobile app. As visitors expect the museum to provide the devices, the "bring your own device" approach may not be as widespread as hoped for, as only a minority had already used it. Although this could change in the future with more apps available, research should look into alternative and more engaging forms of interaction in museums. There is evidence that to be present in the moment and enjoy the visit with friends and family is most valued: in this case phones are not the right support as they create a barrier between the visitor, their surroundings and their companions. Opportunities are in novel forms of engagement via bespoke solutions.

Acknowledgements

meSch Material Encounters with Digital Cultural Heritage (2013-2017) receives funding from the European Community's FP7, "ICT for access to cultural resources" (ICT Call 9: FP7-ICT-2011-9) GA 600851.

References

[1] vom Lehn D. and Heath C. Displacing the object: mobile technology and interpretive resources. *Proc. of Cultural Institution and Digital Technology* (2003) http://www.archimuse.com/publishing/ichim03/088C.pdf

[2] Marshall M., Dulake N., Ciolfi L., Duranti D., Kockelkorn H. and Petrelli D. Using tangible smart replicas as controls for an interactive museum exhibition. In *Proc. TEI 2016*, ACM Press (2016), 159-167.

[3] Marshall M., Petrelli D., Dulake N., Not E., Marchesoni M., Trenti E. and Pisetti A. Audio-based narratives for the trenches of World War I : intertwining stories, places and interaction for an evocative experience. *International Journal of Human-Computer Studies*, 85 (2015), 27-39.

[4] Petrelli, D. Ciolfi L., Van Dijk D., Horneker E., Not E. and Schmidt A. Integrating material and digital: a new way for cultural heritage. *interactions: new visions of human-computer interaction*, 20**,** 4 (2013), 58-63.

[5] Petrelli D., Soranzo A., Ciolfi L. and Reidy J. Exploring the aesthetics of tangible interaction: experiments on the perception of hybrid objects. In *Proc. TEI 2016* ACM Press (2016).

[6] Szymanski M., Aoki P., Grinter R., Hurst A., Thornton J. and Woodruff A. *Sotto Voce*: Facilitating Social Learning in a Historic House. *Computer Supported Cooperative Work*, 17 (2007) 5-34.